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NEW SPECIES OF POLYCHÆTA FROM THE NORTH PACIFIC, CHIEFLY FROM ALASKAN WATERS.

BY J. PERCY MOORE.

In connection with the investigations of a special Alaskan Salmon Commission the U. S. Fish Commission steamer *Albatross* established, during the summer of 1903, a series of more than 100 dredging and trawling stations, extending from the vicinity of Vancouver Island along the coast of British America and into Alaskan waters as far north and west as Shelikof Strait. The zoölogical collections were in charge of Prof. Harold Heath of Leland Stanford Junior University, to whom and to Dr. B. W. Evermann, I owe the opportunity of studying the annelids.

Some of the more interesting novelties in the families already fully studied are described in this paper; those of the remaining families will be noticed in later papers, while a full report upon the collection, with a complete list of all stations at which each species was taken, will appear in the publications of the U. S. Bureau of Fisheries.

Not the least interesting result of these investigations is the discovery of a probable error of locality in my paper on Greenland Polychæta. In that paper are described four new species of Polynoidæ, viz., *Gattyana senta, Gattyana ciliata, Lagisca multisetosa* and *Eunoe truncata.* Some surprise was expressed at the occurrence of these new species at a single locality in McCormick Bay, while other bottles of specimens from the same bay yielded none of these, but only well-known Arctic species. There was then, however, no reason for questioning the authenticity of the label. The discovery that all of these are common species throughout most of the region covered by these investigations makes their occurrence in Greenland under the circumstances described exceedingly doubtful. Moreover, the collections of this Academy include several bottles of Polychæta taken by Dr. Benjamin Sharp at Icy Cape, Alaska. On seeing the Polynoidæ in question Dr. Sharp states his belief that they were collected by him. It seems almost certain, therefore, that the McCormick Bay label was misplaced in this bottle, and that the specimens really came from Alaska. Unless confirmed by subsequent discoveries the Greenland record should be ignored as valueless.

Eunoe truncata was described from a fragment of the anterior end and proves to have been incorrectly referred. Numerous perfect specimens in this collection show that this is an elongated worm and properly belongs to Kinberg's genus *Hermadion*, if this be recognized as a distinct genus.

Aphrodita negligens sp. nov. Pl. XXXIV, figs. 1, 2; Pl. XXXV, fig. 31.

This species presents a very characteristic shaggy and disordered appearance, owing to the manner in which the loose tufts of coarse dorsal setæ, instead of lying recumbent on or in the dorsal felt, as usual in species of this division of the genus, stand erect and arch high above the back. As a result also of this relation the back appears flat beneath these setæ and the sides are nearly vertical. The general outline is narrowly ovate, the caudal ⅕ attenuated. The extreme lateral margins are formed by the neuropodia and their setæ below, by the convexities of the lateral dorsal bristles above, while the iridescent bristles fall in spreading vertical tufts in the space between but are too sparse to conceal the neuropodial setæ. The dorsal felted area between the bases of the most medial dorsal spines covers about ⅔ of the width of the back, but the spines themselves arch over this area and, as the longest almost meet, form a sort of imperfect bower. As shown below, while there are really but two series of these spines the uppermost tufts are inserted alternately at different angles and consequently perforate the felt at different levels, thus giving an appearance of three series. The segments, of which there are 41 bearing setæ, are strongly defined ventrally, where the body is deeply marked by a median neural groove and a pair of lateral furrows just inside the bases of the parapodia. The anus is small, dorsal, subterminal and posterior to somite XXXVIII.

Numerous minute sharp-pointed cuticular papillæ stud the surface of the body above and spherical papillæ even more thickly below, and the neuropodium as well. Those on the latter vary much in size, being nearly twice as large on the ventral as the dorsal surface of the neuropodium, and especially large ones are clustered about the base of the ventral cirrus.

The prostomium is slightly broader than long, with the pedicle of attachment narrowed dorsally and is smoothly rounded on all sides. There are two pairs of small pigmented eyes, the two on each side being borne on a common slight prominence on the anterior face of the prostomium. On both of the two specimens in hand the median tentacle is missing. The palpi are rather stout for the basal ⅓, then taper rapidly to the slender terminal half, the total length being 4½ times the prostomium. The surface is covered with minute prickles. The frontal caruncle is a compressed, vertical plate as long as the prostomium and much deeper, with its upper border thickened and somewhat lobulated and its ventral margin forming an angle from which an unusually long finger-like process depends over the mouth. The mouth has the usual characters and is bounded posteriorly by III. The dorsal tentacular cirri are about $\frac{1}{2}$ and the ventral about $\frac{1}{3}$ the length of the palpi.

Elytra to the number of 15 pairs occur on the usual somites. They are all thin, delicate, smooth and membranous and, except for a slight brown incrustation on the middle ones, quite colorless. Being of large size they cover the back completely and overlap medially. In the middle region they are nearly orbicular and slightly emarginate, but scarcely auriculate as in some species The scar is anterior to the center and reaches to the lateral emargination. Those of the first pair are narrowly ovate, extending over and concealing the head. The next have the part anterior to the pedicle larger than that posterior. Toward the posterior end they become narrower and relatively much longer.

There are 15 pairs of "branchiæ" (fig. 31) also, supported on somites VI, VIII, X, XII, XIV, XV, XVI, XVIII, XX, XXII, XXIV, XXVI, XXVII, XXIX and XXX. They arise from the extreme postero-lateral region of the dorsum of their somites and are rather larger and more complex than in many species. The medial side is high and rises vertically to an angle from which the organ slopes laterally to the level of the back, bearing the often bifid or trifid pinnæ on its free sloping margin. The number of terminal branches varies from 4 on the last and 6 on the first to about 12 on the larger branchiæ of the middle region. The elytra and gills were studied on the type specimen only

Parapodia are of the usual form. The ventral cirrus scarcely reaches the base of the second row of neuropodial setæ. After tapering for most of its length the cirrus is provided with a subterminal enlargement followed by a constriction and a terminal ball. Dorsal cirri spring from a large ceratophore and the long slender style is shaped distally like the ventral cirri. Like the ventral surface of the body the parapodia are thickly studded with spherical papillæ of various sizes, the larger ones increasing in number laterally and a group of especially large ones occurring on the base of the ventral cirri, while slightly smaller ones are closely crowded about the bases of the setæ.

On cirriferous somites the notopodial setæ are arranged as follows: A dense tuft of not very long capillary bristles springs from the ventral side of the tubercle and spreads ventrally and caudally over and between the neuropodia. The deeper concealed ones are colorless, those on the exposed surface of the tuft iridescent, but they show little brilliancy, being usually of a pale rose-red with dull green or occasionally bluish reflections. Compared with some species they are coarse and rather short, so that they do not conceal the neuropodial setæ. Posteriorly they become dull gray. Immediately anterior to the dorsal cirrus is a tuft of about 7 of the large curved setæ arranged in a transverse row and becoming larger dorsally. A second more median tuft, which springs from a line curving obliquely caudad and mediad, consists of 10 or 11, the ventral ones being very small and the dorsal much larger than any in the more lateral tuft, so that they nearly meet those of the opposite side in the median line. These setæ are of a peculiar clay brown color, of rather soft though brittle texture, finely striated, strongly curved, very coarse at the base and gradually tapered to near the end, which is abruptly contracted to a hard, strongly hooked, acute tip (fig. 2). The surface is devoid of asperities, perhaps through wear. Between these two tufts and anterior to the more lateral a second tuft of iridescent capillary setæ, more slender than those described above, arises and spreads caudally and dorsally of the bases of the large setæ. The dorsal felt fibres arise in a compact bundle dorsal to the dorsalmost tuft of large setæ. The neuropodial setæ are arranged in the customary 3 rows, the dorsal usually containing 2 stout, the middle 3 medium and the ventral 5 more slender ones (fig. 1). All are of similar form, slightly curved and somewhat hooked and tapered at the tip. All of these setæ are much worn, the points blunt and only slight traces of the hairy sheath remaining.

On elytra-bearing somites the arrangement is the same, except that the bundle of felt fibres is wanting and the dorsalmost tuft of large setæ is inclined more medially so that they penetrate the felt nearer to the middle line than on the cirri-bearing somites, leading to the appearance of three series of large setæ, as mentioned above.

At the ends of the body the parapodia are considerably modified. Posteriorly the notopodium becomes relatively more elevated, the whole parapodium more compressed and turned so that it overlaps its successor behind, the capillary setæ tufts more flattened, the neuropodial setæ more slender, the large notopodials more crowded, and the dorsal cirri relatively longer. At the anterior end the first has the usual 3 tufts of capillary bristles, and the dorsal barely longer than the ventral cirrus, the excess being due entirely to the length of the basal joint. The second bears 2 dorsal and 2 middle neuropodial setæ, and a tuft of short fine bristles in place of the ventral tuft of capillary setæ, which is not fully established till about somite VI.

The type of this species is No. 944 in the collection of this Academy, taken by the U. S. F. C. steamer *Albatross* at station 3,727, off Japan. This specimen measures 42 mm. long, 17 mm. wide exclusive of the setæ, and about 9 mm. deep. A larger example, measuring 60 mm. long and 40 mm. wide in a much contracted condition, was taken off Port Townsend at station 4,205. It agrees in all respects with the foregoing description, which is based upon the type, and has the body cavity filled with egg strings.

Aphrodita parva sp. nov. Pl. XXXIV, figs. 3–7.

This interesting species is founded upon two specimens of 6 mm. and 9 mm. long respectively, the latter having a maximum breadth of 6 mm. at XI, which is about the middle of the body. Owing to the deposit which completely covers the body above the general outline is broadly elliptical, but beneath this the form is that typical of the genus though less attenuated posteriorly. Twenty-seven segments bear parapodia

The prostomium (fig. 3) is broadly elliptical with the long diameter transverse and about 1⅓ times the length. The posterior margin is slightly concave; the anterior face bears a slight median elevation for the tentacle, and on each side and slightly above it a somewhat more prominent papilla bearing two minute pigmented eyes. A small compressed frontal tubercle having a smooth surface without lobulations lies between the bases of the palpi. The slender tentacle, which is about 2½ times as long as the prostomium, consists of a rather stout vase-shaped ceratophore bearing a slender tapering style with a terminal knob. The palpi arise close together from the ventral surface of the prostomium; they are about twice as long as the tentacle, relatively slender, and taper regularly from the base to a blunt point; their surface is devoid of cilia. Although the large mouth is situated unusually far forward, being bounded posteriorly by a broad, smooth, unfurrowed lip formed by II, the ventral nerve cord may be seen through the skin to bifurcate to form the circumœsophageal connectives at IV, the usual position of the lip.

Notwithstanding the great breadth when viewed from above, the body when seen from below is really more slender than usual in the genus, the widest part being only about ⅓ the apparent width and much less than this posteriorly. The cuticle is opalescent and thickly covered ventrally with spherical papillæ. Being thickly covered above with a grayish flocculent deposit the undisturbed animal looks much like a piece of sponge or organic débris. On each side is a broad ridge where the dorsal setæ rise above the felt, each one or tuft supporting a thick vestment of the deposit, which increases its thickness many fold and adheres with great tenacity. When this deposit, together with the superficial layer of felt supporting it, is cleared from the back a deeper clean layer of felt is exposed, through which the elytra are visible.

There are 14 pairs of the latter situated on somites II, IV, V, VII, IX, XI, XIII, XV, XVII, XIX, XXI, XXIII, XXVI and XXIX. Owing to their very small size and the softness of the tissues the position of the last 2 or 3 pairs is somewhat doubtful, but as they seem to occupy the positions usual in other species these determinations are probably correct. This count was made on but one specimen and a fifteenth pair may be expected to occur on better preserved material. The elytra are smooth, thin, transparent and colorless, without markings or papillæ of any kind. The anterior and middle ones are orbicular, with large, narrow scars running from the lateral margin to the center; the posterior five are very thin, folded longitudinally, elongated, overlapping, with anterior attachment and free posterior ends.

The parapodia are well developed and prominent throughout, relatively more so than in most species of sea-mice. Typical parapodia (fig. 4) have a prominent, rather slender, elongated, slightly compressed neuropodium, its end fashioned into three inverted steps sloping upward and outward. Like the ventral surface of the body the neuropodium is studded, especially below, with spherical papillæ. The ventral cirrus arises from a short base somewhat on the posterior surface proximad of the middle of the ventral border. Its style is slender, tapering, balled at the tip, and reaches nearly to the end of the neuropodium. The notopodium is more elevated than usual in the genus and forms a broad tubercle which slopes on to the back and bears posteriorly a prominent ceratophore from which the long slender style of the dorsal cirrus arises. The latter is 2¼ to 2½ times the length of the neuropodium, is slender and regularly tapered for ⅔ of its length, then slightly enlarged and again tapered to a terminal ball with thickened cuticle perforated at the end for sensory hairs. These cirri rise above the felt and their ends often appear above the material deposited on the back. Toward the ends of the body the parapodia become both much smaller and more slender; posteriorly they are directed caudally and their dorsal cirri are much elongated; anteriorly the first is bent forward by the sides of the prostomium and bears a tuft of slender setæ and the tentacular cirri at its end. The ventral cirrus of the second parapodium approaches the dorsal in size and form.

Notopodium and neuropodium are each supported by a stout aciculum, both of which are nearly colorless and the former strongly curved and terminating just below the base of the dorsal cirrus, the latter straight and projecting rather prominently through the apex of the neuropodium.

The setæ are arranged as usual in the genus (fig. 4), but in certain respects resemble those of *Lætmatonice.* The neuropodial setæ are arranged in 3 horizontal rows arising from the three steps on the end of the neuropodium. The dorsal contains 1 or 2 of the stoutest, the middle 2 or 3, and the ventral 3 or 4 of the smallest. While retaining the same general characteristics they differ much in detail. The free portion of the largest (fig. 6) exceeds the neuropodium in length, is nearly straight and uniform in diameter to the distal $\frac{1}{3}$, which is very gently curved and tapered to a point encased in a densely hairy sheath terminating in a tuft of very coarse fibres with an often recurved axial prolongation. The smallest ventral setæ are nearly colorless, instead of deep yellow like the larger ones, and much less striated longitudinally. Their shafts are distinctly curved, with a short enlarged end (fig. 5*b*) tapering rather abruptly to somewhat hooked tips with less densely hairy sheaths, often worn away. The middle setæ (fig. 5*a*) are intermediate in character. Usually 1 or 2 setæ of the middle and ventral series are provided with a stout curved spur at the base of the terminal region. The location of such setæ is so irregular and their resemblance to the other setæ otherwise so complete that the possibility of this spur being caducous is suggested, yet this is opposed by the firmness with which it is fixed whenever present.

Coarse notopodial setæ are found in two tufts, one of 8 to 10 anterior to the dorsal cirrus and a more dorsal one of 10 to 12. In each bundle they diminish in both length and thickness from the dorsal to the ventral margin. They are brown, polished, flattened and though standing nearly erect are more or less curved toward the median line. The longest are 3 mm. long and, relatively to the size of the animal, very stout at the base, at first gently but in the outer part rather abruptly tapered to a slender end with minute superficial asperities and a hooked tip (fig. 7). The smaller ones are similar but frequently taper to a point lacking the hook. On the ventro-anterior aspect of the notopodium is a dense spreading tuft of setæ varying in size from the smallest of the dorsal groups to strictly capillary fibres; all taper to capillary ends which lack hooks but are provided with recurved asperities coarser than those on the dorsal setæ. This tuft corresponds to the lateral iridescent hairs of the sea-mouse but is dull and gray in the present species. A very large and dense bundle of felt fibres arises on the dorsum of the notopodium and smaller tufts between and anterior to the large setæ. They form a felt much thinner but otherwise similar to that of the large species.

This species is evidently closely related to *A. intermedia* McIntosh, dredged by the *Challenger* in the West Indies, which is, so far as known, somewhat larger. The latter species is very briefly described from a single specimen, but appears to differ from *A. parva* chiefly in the absence of ocular papillæ and eyes, the form of the neuropodial setæ and their longer spurs which, it is implied, occur on all setæ. Although these two stand apart from the remaining species of the genus they can scarcely constitute a group of greater than subgeneric value. In any case it is interesting to find such a comparatively minute representative of a genus that includes some of the bulkiest of polychætes.

The two known examples of *A. parva* were taken in the Gulf of Georgia at station 4,194, in 111 to 170 fathoms.

Euphrosyne bicirrata sp. nov. Pl. XXXIV, figs. 8–12.

In their contracted state the largest examples are 20 mm. long and 6.5 mm. in greatest width, with 25 setigerous segments, all well differentiated. The body has the usual robust, depressed form with the anterior end broadly rounded and the posterior decidedly narrower and more tapering. The smooth dorsal area is completely concealed by the notopodial setæ, but when the latter are removed proves to constitute about one-fifth of the width of the back. The dorsal caruncle is short, the basal plate reaching to the anterior margin only of V, while the posterior end of the prominent crest extends freely to the posterior end of that segment. A pair of prominent black dorsal eyes is situated at the anterior termination of the caruncle and between them arises the median tentacle, which is two-thirds as long as the caruncle with a very large stout base bearing a suddenly contracted terminal filament forming one-third of the total length. The ventral eyes are smaller than the dorsal, black and closely approximated and just external to them on each side is a minute tentacle having a length of about two-thirds the width of the prostomial area. The palpi are ovoid, the broader end largely free at III and are separated for their entire length by a very deep longitudinal cleft. Posteriorly they overlap the mouth, which is small and bounded behind by the wrinkled triangular lip incising III and IV. There is a well-marked and continuous neural groove and the subanal cirri are fleshy and of the usual form. The cuticle generally exhibits a pale blue iridescence and on each side of the dorsal area is a series of brown spots.

Parapodia are of the usual form and the two divisions are separated by a broad naked achætous space. All three cirri and the branches of the gills (fig. 12) are long, slender and regularly tapering, the latter shorter and more slender than the former. The cirri stand a little anterior to the branchiferous zone, the dorsal a little medial to the first dorsal gill, the ventral just behind the neuropodial setæ and the middle about halfway between. Usually the dorsal cirrus is somewhat longer than the others. On most of the somites the branchiæ number 7 or 6 pairs, 2 of which usually occur between the dorsal and middle cirri and 5 between the latter and the ventral margin of the notopodial setigerous area. As the latter distance is much the shorter the gills occupying it are much more crowded than those dorsal to the middle cirrus. When but 6 gills are present the missing one is almost invariably the second from the dorsal end. No gills occupy the smooth achætous interramal space as in some species. Individual branchiæ are usually biramous and cleft almost to the base; others have 3 branches, in which case one is usually very much shorter than the other two; or they may be simple and cirriform.

The setæ are all glistening white or colorless, giving to these worms a beautiful silvery aspect. They are also extremely long, and as the worms roll up they give the aspect of bristly balls like chestnut burrs or minute porcupines. Those on the dorsal surface are much the longer and conceal the cirri and branchiæ completely from view. In the notopodial palisade the setæ are disposed in about 4 transverse rows. In the second row, counting from the anterior, are found the deeply cleft serrate setæ (fig. 11), but these appear to rarely extend much dorsad of the middle cirrus. The prongs are slender and their inner margins extensively and prominently serrated. Like other setæ they are hollow, with granular contents impregnated with calcium carbonate. The first, third and fourth rows contain only the unequally pronged bifid setæ, those of the third row (fig. 9), while not much stouter, being nearly twice as long as the others (fig. 10), and having much longer prongs. As is the case with the serrate setæ, the longer prong is expanded slightly opposite the tip of the shorter, beyond which it tapers in a slightly curved point. Neuropodial setæ (fig. 8) have the form of the smooth notopodials, and the longest are about the length of the shorter of the latter. At the ventral margin of the bundles they become much shorter with more strongly curved tips. Dried preparations of the smooth setæ show that their cavities are camerated, with septa and telescoped siphuncle-like tubes much like a *Nautilus* shell, but much less regularly.

This species is most closely related to *E. borealis* Oersted and *E. longisetosa* Horst, but is distinguished from both by numerous characters. It was taken from the Gulf of Georgia to Behm canal, in depths ranging from 18 to 134 fathoms.

Euphrosyne hortensis sp. nov. Plate XXXIV, figs. 13 to 16.

Length about 22 mm., width 7 mm., number of segments 35 to 38. The general aspect of the dorsum of this species reminds one of a well-kept garden with a central avenue from which diverge parallel rows of plants with aisles between.

The body has the usual depressed form, flat below, slightly arched above; in contraction the two ends are rounded nearly equally. Below the segments are strongly marked; above they are more obscured by the gills and setæ except in the median space which equals about $\frac{1}{7}$ of the total width and in which each segment is divided into a posterior median and a pair of anterior lateral areas. The caruncle is long and narrow, reaching from II to the posterior margin of VI, with a pair of pronounced lateral longitudinal grooves and a narrow but distinct median ridge or crest, the posterior end of which is free. At the end of the caruncle are the conspicuous, black, dorsal eyes, sometimes two pairs, of which the anterior are the larger, sometimes a single pair of elongated form, or occasionally a single one on one side and two on the other. A median tentacle arises from between the eyes and has a length of barely $1\frac{1}{2}$ times the width of the caruncle; it is 2-jointed, the basal joint stout, the terminal filamentous and somewhat shorter. On the ventral aspect of the prostomial area between the first pair of forwardly directly parapodia is a pair of black ventral eyes, which are frequently coalesced into a single median one flanked by a pair of minute tentacles. The palpi are continuous anteriorly with somites I and II, and extend caudally as a pair of prominent rounded lobes which end freely at IV, covering the small mouth, which is bounded behind by IV and V. A faint neural groove follows the median ventral line to the pygidium, which bears a pair of short, thick, fleshy, grooved, subanal cirri.

The notopodia are completely coalesced with the dorsal surface and their setigerous areas cover most of the back except the median region. The neuropodia project from the sides of the somites, and between them and the notopodia are narrow oblique smooth areas without setæ, into which the lower end of the series of branchiæ bend forward. All three cirri are rather stout and conical. The dorsal is situated at the dorsal end of the branchiferous line, the middle anterior to the latter and about the middle of the notopodial area and the ventral just behind the neuropodial tuft of setæ.

The branchiæ are situated behind the palisade of notopodial setæ, beginning at the dorsal cirrus and extending forward around the ventral border of the setæ into the interramal area. Owing to the relatively short notopodial setæ the gills show distinctly and the body appears more depressed and has a dorsal aspect totally different from *E. bicirrata*. Like *E. heterobranchia* and some other species the form of the gills (fig. 16) varies greatly. A few near the ventral end of the series are often quite simple and cirriform, and from this unbranched form they vary to those with as many as 8 branches, the complexity of the branching increasing with approximate regularity from the ventral to the dorsal end of the series, except that the ventralmost gill is usually much more branched than those immediately above it. The following table shows the number of branches counted on segments of the middle of the body of four specimens, the position of the three cirri being indicated by their initial letters:

D.C. 6, 8, 7, 7, 6, M.C. 6, 6, 6, 6, 4, 2, 3, 3, V.C.
D.C. 7, 7, 6, 6, –, M.C. 5, 5, 4, 3, 1, 1, 5, –, V.C.
D.C. 6, 5, 6, 5, 5, M.C. 5, 5, 4, 4, 1, 1, 6, –, V.C.
D.C. 7, 6, 6, 5, –, M.C. 5, 5, 4, 3, 3, 2, 5, –, V.C.

The 2 or 3 ventralmost gills occupy the space between the neuropodial and notopodial setæ, and it will be noticed that 4 or 5 lie dorsal and 7 or 8 ventral to the middle cirrus. The larger numbers are found upon the larger and the smaller upon the smaller specimens, but it seems probable from a comparison of the number of branches that both divisions and coalescences of the ventral gills occur. Reduced numbers are found also on a few segments at each end of the body. The branches, which seldom arise upon a strictly dichotomous plan, spread widely from a short trunk into a low bush-like form and terminate without expansions in slender, tapering tips.

All setæ are white or colorless except at the extreme tips, which are stained with sulphur yellow. All are translucent, very brittle and hollow, with their cavities filled with the usual granular contents. The notopodials are slightly longer than the gills and of two forms. Deeply cleft, very strongly and extensively serrate setæ (fig. 15) occur in the middle rows of the palisade. The remaining rows have only stout spurred setæ (fig. 14) without serrations, and there are no deeply cleft or bifid setæ without serrations. The spur is always very short, though the internal cavity is deeply bifurcate. Many of these setæ have the middle part of the shaft encircled by many fine parallel canals situated just beneath the cortical layer and more or less completely annular. The neuropodials are somewhat longer and more slender. They have more slender, longer and more curved tips and longer lateral spurs than the notopodial setæ just described and in some cases at least the cavity is not bifurcate (fig. 13). The setæ of the middle region depart remarkably little from the exact forms figured for the three kinds.

This species appears to resemble *E. maculata* Horst rather closely, but is readily distinguished by the position of the middle cirrus, which is between the second and third gills in the latter. From *E. heterobranchia* Jonnson the absence of smooth cleft notopodial setæ especially distinguishes it, while *E. aurantiaca* Johnson and *E. superba* Marenzeller both have a smaller number of gills, longer spurs to the notopodial setæ and other distinguishing features.

This species is much less common than *E. bicirrata*, and was taken at stations 4,272 and 4,274 only, in Chilkoot Inlet, Alaska, in 45 to 73 fathoms.

Eunoe depressa sp. nov. Pl. XXXIV, figs. 17, 18, Pl. XXXV, figs. 19 and 20.

An interesting species of at least partially commensalistic habits. The type is 30 mm. long, 11 mm. between the tips of the parapodia, and 14 between the tips of the setæ at XVII, the broadest somite. The largest specimen is 40 mm. long.

The prostomium is about as long as broad, divided anteriorly by a deep median furrow which reaches half its length; its lobes produced into divergent, widely separated and prominent peaks. Of the two pairs of eyes the anterior are slightly the larger, strictly lateral and at the widest part of the prostomium near the middle; the smaller posterior pair dorsal, less widely separated and close to but distinctly anterior to the posterior margin of the prostomium. All of the cephalic appendages are short and stout. The median tentacle is barely 2½ times the length of the prostomium, its base very short and stout; the proximal ⅔ of the style thick and little tapered, ending in a slight enlargement beyond which it abruptly contracts into a delicate terminal filament; its surface is covered with numerous but short cilia. The lateral tentacles arise entirely ventral to the median, close to the median line and quite inside the line of the peaks; they are stout, taper gently for about the proximal ⅗ and beyond that are contracted abruptly into a terminal filament; the ciliation is sparse. The palpi are stout, short, in all 4 specimens much shorter than the median tentacle, the terminal filament of which they barely reach; their own terminal filament is minute; their cilia are arranged along a few longitudinal lines. The tentacular cirri resemble the median tentacle, which the dorsal almost equals, while the ventral is ¼ shorter. In one specimen the protruded proboscis is short and broad, 7 mm. long and 3.5 wide. The jaws are deep brown, strong and with a prominent lateral ridge on the jaw plate. There are 9 soft papillæ above and 9 below.

Fifteen pairs of elytra are borne on the usual somites by stout elytrophores which are nearly equalled in size by the homologous dorsal tubercles of the cirriferous somites. The elytra (fig. 20) are thick, stiff and of tough, cartilaginoid texture; the margins bear only a few goblet-shaped sensory papillæ and traces of a few or no cilia; the dorsal surface is studded with small, distant, horny spines and much more numerous, smaller, horny prickles; the former are always in the center of round, slightly elevated brown spots and the latter, while themselves brown, are surrounded by a pale ring. The first elytron is circular, the next 11 subquadrate reniform, and the last 2 or 3 broadly ovate, the last with a straight inner margin.

Typical parapodia (fig. 19) are rather long, high and compressed. The neuropodium is prominent and slopes both dorsally and ventrally to the prominent acicular process which is produced into a short soft supraacicular papilla. The notopodium is also large and produced into a prominent acicular process. The ventral cirrus is subulate, with a slender end reaching to about the third row of subacicular setæ. The dorsal cirrus is remarkable for the great length of the ceratophore which is ⅔ as long as the style and in close contact with the dorsal border of the notopodium. The style is short and stout, little tapered and has a subterminal enlargement tapering into a slender tip.

The body is very flat and much depressed, widest near the middle and tapering both ways. Nephridial tubercles exist on all but a few of the most anterior somites; they are of moderate length and are directed dorsally between the bases of the parapodia. The anal cirri are similar to the dorsal cirri and equal to the last 9 segments in length.

Neuropodial setæ are borne in 3 supraacicular and 8 subacicular series, those in the dorsal rows being, as usual, more slender and provided with a greater number of spines. They (fig. 17) are moderately slender with rather elongated ends provided with numerous rows of spines which become larger and more prominent distally; the smooth tip is rather long, slender and but little hooked. The parapodium of I, bearing the tentacular cirri, has a small neuropodium with an acicular process and 2 or 3 setæ. The notopodial setæ (fig. 18) are relatively few in number, much stouter than the neuropodials, the dorsal ones especially being short and stout and the longest ventral ones about ½ the length of the longest neuropodial setæ; they are closely pectinated with ¾ rings of fine spines, leaving a smooth tip somewhat less in length than the greatest diameter of the seta.

The body throughout is colorless, the exposed parts of the elytra mottled with white and rich brown, the caudal cirri, dorsal cirri and cephalic appendages brown with a subterminal white ring and light filament, the palpi only lacking the ring but retaining the white tip.

This species is represented by four examples, the type from station 4,261, Dundas Bay, 8–10 fathoms, and one specimen each from Union Bay, Alaska, and from station 4,270, Afognak Bay, 14–19 fathoms. The latter is labelled "Hermit crab, messmate," and many of the papillæ on the elytra bear 2 or 3 spines.

Antinoe macrolepida sp. nov. Pl. XXXV, figs. 21–23.

This fine species has a length up to 45 mm. with a breadth of 12 mm. and including the setæ of 18 mm.

The short broad prostomium (fig. 21) is about 1½ times as broad as long, smoothly rounded laterally, broadly cleft and bilobate anteriorly and slightly divided for its entire length by a shallow, dorsal, median furrow. The anterior lobes are broadly rounded and largely occupied by the anterior eyes and the cephalic peaks, usually prominent in the genus, are in this species nearly obsolete. In one small specimen of 14 mm., however, they present the ordinary appearance, and, as the eyes are small, it seems quite probable that in the species as here described we have to do with an epigamous phase in which the great development of the anterior eyes has mechanically or otherwise reduced the size of the peaks. The anterior eyes are very large, provided with well-developed lenses, and occupy the entire antero-lateral aspect of the prostomium, facing forward and outward. The posterior eyes appear by comparison minute, and are widely separated on the postero-lateral curvature of the prostomium; in the preserved specimens they are always partly hidden by the bases of the elytrophores of somite II.

The median tentacle is long and slender, 5 or 6 times the length of the prostomium; its ceratophore is more than ½ as long as the latter, and the delicate style tapers regularly to the outer ¼ where a slight thickening occurs followed by a slender terminal filament. It bears a few scattered clavate cilia. The very small lateral tentacles spring from short, nearly spherical ceratophores situated on the ventral surface of the anterior prostomial lobes and partly beneath the median tentacle. Their total length is only 1½ times the prostomium and their slender subulate styles have the terminal half almost filamentous. The palpi are likewise slender and from 6 to 9 times (usually the former) the length of the prostomium. They taper regularly to an acute tip and are marked with longitudinal ciliated lines. The tentacular cirri are similar in form to the median tentacle, but they are much more strongly ciliated and only $\frac{2}{3}$ as long. The mouth is bounded behind by a strongly furrowed lip which reaches to III. In a specimen 30 mm. long the proboscis is extended to a length of 9 mm. and a breadth of 3 mm. It is provided with acute jaws of the usual form and bears 9 soft papillæ above and 9 below.

The body is narrow and nearly linear; its ventral width scarcely equals the extreme length of the parapodia, and is practically uniform from somite V to the middle of the body, beyond which it tapers very gently to the pygidium. A strongly marked neural groove runs for its entire length. Nephridial tubercles are first evident on IX and are nowhere much elongated. Dorsally the greatest width is from VIII to XIX. There are 39 somites.

The 15 pairs of elytra are borne on somites II, IV, V, VII, IX, XI, XIII, XV, XVII, XIX, XXI, XXIII, XXVI, XXIX and XXXII. They are remarkably large, overlap broadly both antero-posteriorly and medially, have a soft membranous texture and a weak attachment, so that they are easily detached. The first is subcircular, the next 3 are broadly reniform, and those following, except the last, broadly elliptical; the last is broadly subovoidal with a straight inner margin. To the naked eye the scales appear quite smooth, but a moderate magnification shows the greater part of the surface covered with scattered small, slightly curved, conical spines which become more numerous toward the posterior margin where they are associated with a few slender, clavate cilia. Cilia of various lengths occur also on the free margin of the scales. It appears that in nature the elytra are frequently lost and replaced, and that when detached asymmetrically the remaining one of the pair will increase in size and completely cover the back as far as the bases of the dorsal cirri of the opposite side. Even when both elytra of a pair are symmetrically developed they overlap so broadly in the median line that less than half of their extent is exposed when all are in place.

As indicated above the parapodia are elongated and fully equal the body width. The prominent and slender neuropodia are obliquely truncate distally and have the dorsal angle prolonged anterior to the setæ into a slender acicular process with a free filament equalling the ventral cirrus in length. The notopodium is a low cylindrical process arising rather anterior to the base of the neuropodium and bears the slender acicular process which is not prolonged into a filament beyond the place of emergence of the aciculum. The notopodial cirri have a form similar to the median tentacle, but the subterminal enlargement is rather more prominent and the entire style about $\frac{1}{4}$ longer so that they reach well beyond the tips of the longest setæ. They bear clavate cilia which decrease in size and number distally and are altogether absent from the distal filament. The ceratophores are small and slightly dorsal and posterior to the base of the notopodium. Ventral cirri arise well distad of the middle of the ventral surface of the parapodium; they have slender subulate styles that barely reach the base of the neuropodial acicular process. Toward the ends of the body the parapodia undergo the customary changes in form, the posterior dorsal cirri especially being very slender, elongated and nearly lacking the subterminal enlargement.

Each ramus of the parapodium is supported by a tapering aciculum, especially stout in the case of the neuropodium, and suddenly reduced in diameter at the end, which is free for only a short distance. All of the setæ are of a pale glistening straw color and to the naked eye or under a hand lens appear to be highly burnished. The notopodials (fig. 23) are relatively few in number and spread radially from a center. The dorsal ones are quite short; the ventrals about $\frac{2}{3}$ as long as the longest neuropodials. All are rather stout, nearly straight, with short, bluntly pointed, smooth tips and numerous rows of minute spines extending about half way round the seta and covering about $\frac{1}{2}$ of its exposed portion. All of the neuropodials and especially the supraacicular ones are very long and slender. They are arranged in a dense tuft spreading vertically. The shaft is very slightly curved and the distal thickening (fig. 22) remarkably elongated and at the tip (fig. 22*a*) abruptly contracted into a delicate terminal bristle. All of this region is furnished with numerous short transverse rows of long, very fine hairs which become longer and more spreading at the tip where a number of the longest overlap the base of the terminal awn. The peristomial parapodium bears small tufts of both notopodial and neuropodial setæ.

The general color of the body above is reddish-brown with narrow, light, transverse, intersegmental lines which become broader in some of the paler specimens, in which also a second narrow transverse line may appear across each segment. The dorsal cirri and all cephalic appendages except the palpi, which are pale, are dark brown with a pale subterminal ring. The elytra are pale marbled with brown, especially posteriorly, or with 2 large divided crescentic spots of brown. One particularly beautiful specimen has the body nearly without pigment, and the elytra with large irregular spots and a narrow posterior border of reddish-brown. The ventral surface generally and the parapodia, except their dorsal surface, are unicolor, sometimes clear pale brown, often dark brown or purplish or even nearly black, but always uniform and unspotted and highly characteristic. The neuropodial cirri are always pale and in strong contrast to their dark surroundings.

Many of these large-eyed examples are sexually mature and, as mentioned above, it is probable that they represent the epigamous phase, which the long setæ indicate may be pelagic. The single small-eyed individual is only 14 mm. long and immature, but the neuropodial setæ are elongated and exactly like those of the larger specimens.

A. macrolepida is quite plentiful at the more northerly stations, but occurs as far south as the Gulf of Georgia, at station 4,192, in 89 to 97 fathoms, but also in 293 fathoms in Chatham Strait, from which the type came at station 4,264.

HOLOLEPIDA gen. nov.

The body is much elongated; anteriorly elytra and dorsal cirri alternate in the usual manner, but in the middle and posterior regions all segments bear elytra only; a large free nuchal plate overlaps the prostomium dorsally.

Hololepida magna sp. nov. Pl. XXXV, figs. 24–29.

Unfortunately but a single specimen represents this interesting species. This is in three pieces, apparently making up the entire worm, as they fit together accurately. If this be the case the total length from the anterior margin of the prostomium to the posterior margin of the pygidium is 250 mm., the number of somites 120 and the arrangement of the elytra as indicated below. The form is elongated and depressed, increasing in width to about XXV, then remaining uniform to about the last 20 segments.

The prostomium (fig. 24) is twice as wide as long, omitting the tentacular prolongations, deeply divided by an anterior cleft and a median dorsal furrow, its posterior border straight and concealed and the lateral angles very prominent. Anteriorly it is prolonged into a pair of prominent tentacular processes in the fashion of *Lepidonotus*, though they lie on a somewhat lower plane than in that genus, being slightly ventral to the median tentacle. The two pairs of eyes are very large, occupy the entire postero-lateral portion of the prostomium and their pigment cups are coalesced. Both are blue-black and possess distinct lenses. The anterior pair looks forward, upward and outward and the posterior upward and backward. The median tentacle arises from a large swollen base which fills the anterior cleft, but the style is lost. As noted above, the ceratophores of the lateral tentacles are the anterior prolongations of the prostomium, which nearly equal and lie somewhat ventral to the median tentacle; their styles are slender, about 2½ times as long as the prostomial width, and taper to the tip without a subterminal enlargement. Comparatively very stout palpi crowd the peristomial parapodia; they are constricted at the base, then swollen and again tapered to acute tips; their length is about 1½ times the lateral tentacles; each is marked longitudinally by a prominent broad ridge and lateral impressed lines.

The buccal parapodia are prominent and elongated, reaching directly forward far beyond the prostomium; they are swollen at the base, deeply cleft at the end and bear no setæ. The tentacular cirri have a distinct subterminal enlargement tapering into a filiform tip. They somewhat exceed the lateral tentacles in length. As usual in the family the proboscis is stout and muscular. When fully protruded it measures 21 mm. long, equalling the first 17 somites, and 7 mm. wide by 9 mm. deep. Its surface is strongly wrinkled and its end bears 16 soft papillæ above and 16 below, all nearly fan-shaped and folicaeous in this specimen, but probably collapsed. A pair of stout jaw-plates above and below are subtriangular, each bearing at the anterior angle a blunt claw-like tooth followed on the lateral border by a dentinal ridge. At the base of the proboscis, on the dorsal surface between the bases of the palpi, is a single prominent tubercle.

The peristomium is scarcely evident as a distinct ring, being completely united with the prostomium and succeeding somite. From the dorsum of the latter (II) arises a prominent nuchal fold similar to but larger than that of *Halosydna gelatinosa*. It is subtriangular, attached by its posterior border but otherwise free, and conceals the entire posterior and middle portions of the head. It can be drawn forward so as to cover much more than shown in the figure.

Generally the segments are well differentiated and about 4 times as wide as long. The nephridial tubercles are prominent, begin on somite XII and project outward and backward. Parapodia are much elongated, quite equalling ⅔ of the width of the body. The neuropodia are strongly predominant, broad and truncate at the ends, with a pointed somewhat membranous presetal lobe which conceals the end of the aciculum. The notopodia are small and very slender; they arise from the middle of the dorsal surface of the neuropodia and enclose a slender aciculum. Dorsal cirri arise just above the notopodia, from large stout bases having a prominent glandular lobe. Their styles are long, about equalling the width of the body without the parapodia; they taper regularly, then suddenly to a terminal filament, and reach far beyond the end of the foot itself to the tips of the elongated setæ; no cilia or papillæ are borne on the surface. These cirri are confined to the segments lacking elytra at the anterior end and all are of equal length. Ventral cirri occur on all segments. They arise from about the middle of the ventral surface of the neuropodium and reach nearly to the tip of the presetal lobe. In form they are rather stout and conical with a short terminal filament. That borne on II has a large ceratophore and a style resembling the dorsal cirri in form and size. The next one has no ceratophore and the style is about half as long, while succeeding ones regularly diminish in length until the normal is attained. At the posterior end the parapodia diminish in size and the ventral cirri are relatively much longer. The caudal cirri are similar to the dorsal cirri and equal the last 9 segments.

Elytra are probably more numerous than in any other species of the family. They occur on II, IV, V, VII, IX, XI, XIII, XV, XVII, XIX, XXI, XXIII, XXVI, XXIX, XXX, XXXII, XXXIII, XXXV, XXXVI, XXXVIII, and then on every somite for 79, leaving only 3 or 4 very small somites at the caudal end doubtful, though these certainly bear no dorsal cirri. It is true that a majority of the elytra are detached and lost, but in several cases they remain on 3 or 4 successive segments. There is, moreover, no mistaking the elytrophores, which are thick, prominent and wrinkled, with swollen margins surrounding the scars. The continuous presence of elytra is further indicated by the total absence of dorsal cirri from this region. Even on the cirriferous somites there is a broad dorsal tubercle with a slightly free margin. It is barely possible that this specimen may be abnormal, but the constancy and regular, paired arrangement of the elytrophores render this extremely improbable. A very few cases were noted in which the elytrophores and elytra were of smaller size than usual. The elytra are of a very soft gelatinous texture, of large size, with nearly central scar, and the margin is broadly lobed and so folded as to draw the elytron into a funnel form. Both those of the same pairs and on contiguous somites are curiously adherent over the back, forming a sort of irregular roof. The adhesion results from a gritty substance, perhaps an extraneous deposit, perhaps a secretion, but apparently not due solely to the method of preparation, as other species contained in the same bottle are free from it.

The dorsal surface of the body generally, the head and its appendages and the proboscis are raisin color; the elytra are more or less tinged with the same. Owing to their being distended with eggs the parapodia are dull yellowish. The entire ventral surface is dirty white.

The setæ seen in mass are of a pale yellow color. The notopodials (fig. 29) arise from the base of the prolonged acicular process and spread horizontally. They are very long and slender, capillary, nearly straight, tapered regularly from the base and smooth or with barely discernible marginal denticulations and oblique striations. Although the notopodium is well developed on II, III, and IV, it bears no setæ on these somites; the extreme posterior ones are very small. The neuropodial setæ form a large vertical tuft and are of two forms. Those dorsal to the aciculum have slightly enlarged ends more or less denticulate and pectinate and tapering to simple pointed tips. The dorsalmost are slender with long capillary tips and very fine pectination. The ventral ones are much coarser, with shorter and more conspicuously pectinated tips (fig. 28). The subacicular setæ have bifid tips (figs. 26, 27). They are rather abruptly enlarged at the end, rather stout, strongly curved and conspicuously pectinated. The bifid tip has the stout limb beak-like and the slender one bent toward it or even hooked.

The type and only known specimen comes from station 4,198, in 157 to 230 fathoms, on Halibut Bank, in the Gulf of Georgia.

Lepidonotus robustus sp. nov. Pl. XXXVI, figs. 32–35.

Founded upon a single example, which the label describes as taken from a hermit crab, this species bears a striking superficial resemblance to the similarly commensalistic *Eunoe depressa*. The type is of relatively large size and robust build, measuring 40 mm. long, 13 mm. wide between the tips of the parapodia of X and about 8 mm. deep.

Without including the tentacular prolongations the prostomium is about $\frac{2}{3}$ as long as wide, the posterior border straight and somewhat concealed by a fold of the succeeding somite, the lateral surfaces bulging into ocular prominences behind the middle and converging thence gradually into the lateral borders of the tentacular prolongations. The latter are of the usual form, slightly divergent, and as long as the body of the prostomium. There are two pairs of eyes, prominent, black, circular and lenseless. The anterior are much the larger, situated on the lateral swellings and look outward, forward and upward. The posterior pair are near the posterior border and directed upward.

All cephalic appendages are short and stout and lack cilia and papillæ. The middle tentacle has a short, very stout base somewhat ventral to the tentacular prolongations with which it is largely coalesced; its style is about $1\frac{1}{3}$ times the length of the prostomium with its tentacular processes, and tapers from a broad base to the abruptly contracted tip which is not longer than the basal diameter and scarcely filamentous. The tentacular processes are largely united along the medial face with the base of the median tentacle, their tips only being free for a short distance; the style is similar to the median one, but somewhat more slender, slightly shorter, and with a longer terminal filament having a length of fully twice the basal diameter. The palpi are very stout, bulge widely beyond the sides of the prostomium at the base, and taper abruptly at the end to a short, acute appendage, five longitudinal lines extend for their entire length. On the two sides the dorsal tentacular cirri are of very unequal length, one exceeding the median tentacle, the other being considerably shorter than the lateral tentacle, which is just equalled by the ventral tentacular cirri of both sides; in form they are similar to the median tentacle. The mouth is large with very rugous lips.

There are 26 segments, all of which are broad and stout, and the posterior ones relatively little reduced, though the body is clearly complete. Nephridial papillæ begin on VIII and continue to XXVI; they are elongated, the basal half adnate, the distal half free and curved outward and upward between the parapodia. The caudal cirri are similar to the dorsal cirri, but more tapered and longer, equalling the last 4 segments.

Typical parapodia (fig. 35) are very short and thick, those in the middle region about $\frac{2}{5}$ the width of the body. The neuropodium is obliquely truncate with a very short presetal acicular process near the dorsal angle. The notopodium is a small, rather slender lobe on the antero-dorsal face of the neuropodium and is divided into a prolonged acicular process and a setigerous papilla. The ventral cirrus arises from a rather stout ceratophore near the base of the neuropodium, and its style tapers to a slender tip which reaches slightly beyond the end of the ventral border of the neuropodium. The dorsal cirrus has a very large tapering ceratophore borne partly on the postero-dorsal portion of the parapodium and partly on the body wall and reaching beyond the end of the notopodium; the style has the form of the lateral tentacles and extends beyond the tips of the longest setæ. The last dorsal cirrus is borne on the posterior face of its parapodium and tapers more regularly from base to tip than the others. The ventral cirrus of II resembles in form and size the ventral tentacular cirrus.

There are 12 pairs of elytra (fig. 32) situated as usual in the genus. Notwithstanding their large size they fail to cover the broad back, which is largely exposed along the middle. All, including those apparently of the first pair which are detached, are somewhat irregularly quadrately ovate, thick and of a soft, somewhat gelatinoid texture. Their margins are somewhat folded and irregular but without trace of cilia or sensory papillæ. The exposed surface is somewhat irregular, the white spots being somewhat raised, but there are no spines or papillæ of any kind. The narrow, transversely elongated area of attachment is situated nearest to the anterior and lateral borders.

Neuropodial setæ form a dense fascicle arranged in 3 supraacicular and 7 subacicular horizontal series. They vary but little, are rather stout but less thickened at the end than in many species; the pectinated region (fig. 33) is rather extensive and the smooth tip relatively short and strongly hooked. The notopodials (fig. 34) are a close tuft of rather stiff, acutely tapered setæ marked with close transverse rows of fine teeth. The peristomial parapodium bears a notopodial process with a small tuft of setæ on one side, but lacks it on the other.

Except for a median series of dull brown spots, one on the posterior margin of each segment, the body is colorless. The cephalic and caudal appendages are all deep brown with white tips, the dorsal cirri with but little brown and the ventral cirri white. The elytra are reddish-brown and white. No pigment is found along the anterior border or on an extensive area anterior to and laterad of this scar. A transverse area of clear reddish-brown passes from just in front of the scar to the median border and is concealed by the preceding scale; from this a mottled brown and white area spreads to and along the median and posterior borders, the brown predominating medially, where it is marked by small, round, discrete white spots, while laterally the white becomes predominant owing to the increase in size, number and confluence of the spots. On many elytra there is a narrow, scarcely broken posterior border of brown. The round white spots are slightly raised, and in the center of each is a small yellowish opaque pigment spot or excretophore.

The only known specimen was taken from a hermit crab at station 4,291, 48 to 65 fathoms, in Shelikof Strait.

Lepidonotus cæloris Moore. Pl. XXXVI. figs. 36, 37.

This species, originally described from specimens dredged off the coast of Japan, proves to be one of the most abundant and generally distributed species throughout the region covered by these explorations. It represents in the Pacific the widely spread *L. squamatus* of the Atlantic, and in the younger stages resembles that species more closely, but with increasing age and size the fringe of elytral hairs becomes more restricted and the posterior detached tuft is lost. At the same time the differences in the sculpturing and form of the papillæ and the character of the neuropodial cirri become more marked. Many of the specimens are of a nearly black color.

Ninoe simpla sp. nov. Pl. XXXV, fig. 30; XXXVI, figs. 39–44.

This species has much the form, general aspect and usual size of *Ninoe nigripes* Verrill, but none of the examples in this collection reaches the maximum size of the latter. The body is very fragile and no specimen is nearly complete and none represents the caudal end. The most perfect example, hence designated as the type, consists of 160 segments and is 24 mm. long and 1.3 mm. in diameter. Other larger ones, having a diameter up to 2.5 mm., are less complete.

The prostomium has a slightly depressed sugar-loaf shape, with a length about $\frac{1}{5}$ greater than the basal width. Posteriorly its median dorsal portion is inserted into an overarched recess of the peristomium and here bears a pair of minute brown eyespots, behind which one or two others are sometimes visible. Within this same recess, but sometimes projecting slightly beyond the peristomial fold, is a minute mammiliform process (median tentacle) with a thickened base embraced by a pair of slight lateral folds. Two symmetrical dorso-lateral longitudinal grooves join the sides of this recess posteriorly, and probably enter the deep slit-like nuchal organs seen on each side by raising or dissecting off the peristomial covering. A similar pair of more distinct ventro-lateral grooves join the ends of a deep transverse slit bounding the palpi anteriorly. The palpi are a pair of small rounded lobes facing each other on each side of a deep longitudinal groove and sunk into a depression on the ventral surface of the prostomium or between the latter and the mouth. A rather small mouth is bounded anteriorly and dorsally by these palpi and posteriorly and ventrally by the peristomium.

Except for the special features already indicated the peristomium is exactly like the following segment and, also like it, is apodous. Anteriorly the body is slightly flattened and increases in width to the end of the branchial region, behind which it again narrows and becomes perfectly terete.

Parapodia (figs. 39 and 40) are absent from the peristomium and following somite. Beginning on III they are at first small and placed at a low level, but gradually rise to a middle height and become more prominent in the branchial region, behind which they again decrease in size, but retain the more elevated position. Throughout they are uniramous, the notopodium being a mere tubercle bearing sensory hairs and entered by delicate aciculæ reduced to mere fibres. The prominent neuropodium divides distally into presetal and postsetal lobes, of which the former is short and broadly rounded and without any appendage to about XX, when a small papilla appears projecting freely from its anterior and distal margin directly outward or slightly ventrad. This increases in size for several somites, but becomes again greatly reduced by XLV. The postsetal lobe is always much more prominent; on the first few somites it is rather narrowly foliaceous and strongly curved dorsad, ending in a blunt apex; by somite IX it has become much broader, fully equals in length the base of the parapodium and bears a small but distinct branchial process on the dorsal border near the end. From this point the branchial process increases rapidly in length and becomes somewhat broad and flattened, while the postsetal lobe itself becomes gradually wider (deeper) and shorter, until by XXII it no longer reaches beyond the presetal lobe. At this point the branchial process fully equals the rest of the parapodium in length and projects prominently directly upward. Both the foliaceous margin of the postsetal lobe and its process have an open structure and are richly vascular and they undoubtedly serve as gills. Posterior to XLV the branchiæ are so reduced that the foot (fig. 40) consists only of a tapering base bearing small conical divergent presetal and postsetal lobes which become still further reduced toward the caudal end.

Anteriorly each parapodium is supported by three black aciculæ which are curved and tapered distally and terminate in an acute pale-colored tip projecting freely beyond the surface. Posterior parapodia have but two (fig. 41). The setæ are of two forms, one winged and with acute tips, the other hooded crochets. The former (fig. 42) have black bases and pale yellow exposed portions, are sigmoidly curved, provided with a delicate wing and taper to very acute tips. They vary somewhat in length, curvature and extent of the border. The crochets (fig. 43) are black or deep brown throughout, strongly striated, very slightly enlarged distally and then contracted to a scarcely hooked tip provided with five teeth, of which the lowermost greatly exceeds the others in size. The hood consists of the usual pair of delicate striated pieces which embrace the end of the crochet and conform to its shape. Most of the setæ are broken, but enough can be made out of a comparison of all the specimens to show that acute setæ alone, to the number of about 12 or 14 arranged in a fan-shaped fascicle, are found in the anterior parapodia. The number gradually diminishes and about the middle of the branchial region crochets appear and continue in association with the acute setæ throughout the middle region, while posteriorly 3 or 4 crochets alone remain.

The dissected jaws are shown in ventral view in fig. 44. With the exception of the mandibles they are dark brown. The maxillæ are slender, very strongly curved and acutely pointed; their expanded and excavated bases are borne on separate carriers which are deeply emarginated about the middle of the outer margin, but have the contiguous but distinct median margin straight. A narrow horny bow extends from the lateral and distal angle of each carrier to the corresponding second dorsal jaw. There are 3 pairs of dorsal jaws. The large posterior pair are broadly arcuate, connected posteriorly with the maxillæ carriers by a narrow bar and bear 5 or 6 acute, strongly curved teeth and a blunt tubercle. The second pair are triangular, with smooth sides and a single stout claw-like apical tooth. The anterior are similar, but with the base rather trapezoidal in shape. Unlike the other jaws the mandibles (fig. 30) are white with longitudinal streaks of pale brown, the distal margin wide and irregularly denticulate, with a prominent lateral angle and the base slender. They are very hard and brittle.

N. simpla differs widely from all described species of *Ninoe* known to me in the form of the gills and the presence of the mammiliform tubercle or rudimentary median tentacle on the prostomium. The branchial process corresponds to the dorsal limb of the gill of *N. nigripes*, *N. palmata*, etc., but the palmate gill of these species is wanting, though its base is represented by the expanded portion of the postsetal lobe.

This species was taken in Behm Canal, Alaska, only, at stations 4,235, 4,236 and 4,238, on muddy bottoms, in 130 to 229 fathoms.

Goniada annulata sp. nov. Pl. XXXVI, figs. 45 to 48.

The length of mature specimens considerably contracted in alcohol is from 70 to 90 mm., the greatest width to the tips of the parapodia (not including setæ) about 3 mm. The prostomium, which is broadly coalesced with the peristomium at the base, is depressed and about twice as long as its basal width or about equal to the first 6 or 7 somites; it is distinctly divided into 5 rings, of which the first equals the total of the others which successively diminish in both length and breadth, the last being minute and apparently sometimes absent. A wavy longitudinal groove on each side of the head is joined by the transverse furrows, which do not correspond above and below, and meets the nuchal organs behind; there is also a faint longitudinal ventral furrow. The apical tentacles diverge diagonally from the tip of the prostomium; the dorsal pair, which are slightly the longer, about equalling the transverse diameter of the last ring. Eyes appear to be absent. The palpi are small, low, rounded, immobile and widely separated on each side of the mouth.

The peristomium is fused with the prostomium above and the second somite below, where also it is produced forward as a rather prominent median lip. In complete sexually mature worms there are from 130 to 160 somites, of which all but 59 or 60 constitute the posterior or genital region. Especially in the anterior region the segments are well defined, smooth and terete, increasing in length to about XXX, and in width more gradually to XL, where they are about 3 times as wide as long; from that point to LIX or LX they remain nearly unchanged in proportions or even somewhat contracted, except when distended with ova or sperm, when they suddenly expand. In immature specimens this change does not take place. At this point there is internally a strong development of radiating muscles to which the constriction is due, and which form a bar to the movement of the genital products forward. On the other hand, the muscles of the body walls are somewhat weakened and one specimen is actually broken in two exactly at this point. This species, therefore, presents a condition similar to that described for *Goniada foliacea,* which it otherwise closely resembles in many respects. The posterior region is somewhat depressed, an appearance that is much exaggerated by the prominence of the parapodia, especially as the body decreases in width posteriorly. In only one specimen is the caudal cirrus preserved; it arises below the anus and is slender, tapering, and as long as the last 9 segments.

Anterior to XXXIII or XXXIV the parapodia are uniramous, behind that point biramous. The former (fig. 45) consist of an elongated neuropodium terminated by a presetal lobe divided by a deep cleft into slender, nearly conical dorsal and ventral lingulæ and an undivided presetal lobe of similarly slender form and nearly equal length. The ventral cirri are prominent, with swollen bases united to the ventral margin of the neuropodium and followed by a slight constriction, beyond which is a short conical style. Dorsal cirri arise a little above and behind the neuropodium. They have prominent but generally relatively slender bases and broadly ovate foliaceous distal portions bent abruptly dorsad. Beyond a gradual increase in size of all parts, especially the dorsal cirrus and postsetal lobe, relatively little change takes place from before backward. The base of the dorsal cirrus is relatively thickest from X to XX. On the first two parapodia the presetal lobe is undivided and the postsetal altogether absent; on the next 3 the latter increases to its normal proportions.

At XXXIII or XXXIV the notopodium appears somewhat suddenly and immediately bears setæ. It consists of an acutely conical presetal lobe and a minute rather ventral postsetal tubercle and is nearly half as long as the neuropodium. From the point of its appearance caudally the notopodium and all other parts of the foot gradually increase in size and become foliaceous, especially the neuropodial lobes and the notopodial cirrus. At LIX or LX the entire parapodium suddenly becomes larger and more folicaeous, without, however, any change in its fundamental characteristics. It is at this point that the posterior genital region with its swimming setæ begins. In a typical parapodium of this region (fig. 46) both notopodium and neuropodium are large and well separated. The former is the smaller and consists of a presetal lobe broad at the base and with a nearly conical terminal portion and a short, broad, presetal lobe situated somewhat ventrally. The cirrus arises from the dorsal base and a little posterior to the notopodium, has a relatively narrow but flattened base bent abruptly dorsad and bearing a broadly orbicular style, the whole slightly exceeding the notopodium in length. The neuropodium is comprised of the same parts as anteriorly, but the lobes are very much broader and more foliaceous in character; the two presetal ones are terminated by abruptly slender tips, while the postsetal lobe is both broader and blunt-pointed, as well as shorter. The neuropodial cirrus is closely united with the base of the neuropodium and tapers to an acute conical point reaching about half way to the end of the neuropodium. The characters of the foot become emphasized to at least LXXX, behind which the parts diminish gradually in size, the dorsal cirri alone remaining prominent to the end but becoming narrower. Numerous large ova or aggregations of spermatozoa are seen in parapodia of this region, but none anteriorly.

Both notopodium and neuropodium are each supported by a single large tapering acicula. Setæ are of two forms—compound in the neuropodium and simple in the notopodium. Both closely resemble those of *G. foliacea.* The former are arranged in a vertical fan-shaped fascicle and vary in number with the size of the neuropodium. They are colorless, with usually strongly curved shafts terminated by oblique sockets, and bear delicate, nearly straight or curved, acutely pointed and superficially granulated blades. They increase in length both ways to the middle of the fascicle and in the posterior region both shafts and blades are greatly elongated, the exposed parts equalling ½ the width of the body, while the longest in the anterior region are not more than ¼ or ⅕ the corresponding dimension. Simple setæ appear with the notopodia and, like the compound, are arranged in a vertically spreading fascicle composed of never more than about 10 setæ, of which 3 or 4 are ventral to the acicula. They are colorless, shorter than the compound setæ and about twice as thick, slightly curved and rather abruptly tapered to an acute point. Like the compound setæ they are superficially granulated and they are much elongated in the genital region.

A majority of the specimens have the proboscis protruded to various degrees, one to a length of 16 mm., but in no case as far as the jaws. It increases slightly in diameter from the base distally, where it may equal 1.5 mm. in diameter. In the best preserved examples it is fluted longitudinally by about 18 parallel muscular ridges. The entire surface is covered thickly with stiff cuticular papillæ arranged rather regularly in longitudinal rows, to correspond with the ridges. These papillæ are of various sizes, varying from .065 mm. to .02 mm. in height, but chiefly divided into a large and a small set, of which the former crown the ridges and the latter occupy the furrows. These papillæ (fig. 48) are colorless and stiffened by a thick striated cuticle, have broad trilobate bases with the paired lobe forward and the elevated portion a broad-based, pointed and slightly hooked cone, the cuticular covering of which has a deep cleft running up the anterior face and terminating in a pore near the apex.

In the retracted state of the proboscis the position of the jaws varies from somite XXXVII to XLII. The jaws are black and very hard, the principal pair nearer together ventrally than dorsally. The latter (fig. 47*a*) bear 3 or 4 large claw-like fangs which diminish in size medially and point caudal. The accessory jaws are of much smaller and variable size, the dorsal arch containing 14 to 16 besides a few very minute ones. They (fig. 47*b*) have bases which are deeply bilobate anteriorly and broadly unilobate behind, and usually bear a pair of equal divergent claws but sometimes 3 or 1. The ventral jaws are similar and 7 or 8 in number and with the others form an unbroken ring. Anterior to this ring is the jaw sheath consisting of a circle of about 18 soft papillæ. The chevron-shaped jaws form lateral longitudinal series of about 20 at the base of the extended proboscis. As the largest ones occur in the middle of each series and smaller ones at the ends, they form elongated elliptical areas tailing out behind where several quite rudimentary denticles occur.

Considerable individual variation is exhibited in the colors, which have resisted the solvent action of the alcohol quite well. Generally the ground is a yellowish-brown, showing a strong tendency to an annular arrangement in the anterior region where the furrows are pale. Posteriorly it is generally darker and more uniform. Most specimens are more or less blotched or even strongly annulated anteriorly with dark purplish-brown, and each segment in the genital region is marked by a, sometimes very conspicuous, pigment spot at the posterior margin in the median ventral line.

Most of the specimens are sexually mature and have the posterior region distended with eggs or sperm. A couple of immature examples 35 mm. long have parapodia of the usual form, but the distinction between genital and pregenital regions is slight and there are no swimming setæ.

Goniada annulata is a quite common species from Halibut Bank, in the Gulf of Georgia, northward to Chatham Strait. There it occurs in 282 to 293 fathoms at station 4,264. The type comes from station 4,235 in Behm Canal, where in 90 fathoms the species occurs at the least depth recorded.

EXPLANATION OF PLATES XXXIV, XXXV, XXXVI.

(Unless otherwise expressly stated all setæ figured are from somite X.)

PLATE XXXIV. *Aphrodita negligens.*

Fig. 1.—Half of the exposed portion of a ventral neuropodial seta. × 56.
Fig. 2.—Tip of an average hooked notopodial seta. × 82.

Aphrodita parva.

Fig. 3.—Head from above. × 24.
Fig. 4.—Posterior view of right parapodium of X. × 24.
Fig. 5.—Ends of three neuropodial setæ; *a*, spurred and bearded seta from middle series; *b*, bearded seta without spur from ventral series; and *c*, spurred seta without beard from the same. All × 250
Fig. 6.—Bearded neuropodial seta. × 250.
Fig. 7.—End of a hooked notopodial seta. × 360.

Euphrosyne bicirrata.

Fig. 8.—End of a middle neuropodial seta. × 250.
Fig. 9.—Part of a long slender notopodial from a posterior row. × 82.
Fig. 10.—End of a short, smooth and bifid notopodial from the anterior row. × 250.
Fig. 11.—End of a serrate bifid notopodial seta. × 250.
Fig. 12.—Two gills and the middle cirrus (*mc*) from somite XII. × 24.

Euphrosyne hortensis.

Fig. 13.—End of an average neuropodial seta. × 250.
Fig. 14.—End of a smooth-spurred notopodial seta from the posterior row. × 250.
Fig. 15.—Serrate bifid notopodial seta. × 250.
Fig. 16.—Four gills from somite XII. × 24.

Eunoe depressa.

Fig. 17.—A neuropodial seta from the middle of the bundle of somite V. × 98.
Fig. 18.—End of a middle notopodial seta from X. × 98.

PLATE XXXV. *Eunoe depressa.*

Fig. 19.—Posterior view of parapodia from X. × 15.
Fig. 20.—A middle elytron. The larger papillæ are shown as circles, the small horny ones are indicated on a part of the surface by dots and short lines. × 9.

Antinoe macrolepida.

Fig. 21.—The head from above. × 6.
Fig. 22.—An average neuropodial seta, × 56; *a*, tip of the same, × 250.
Fig. 23.—End of an average notopodial seta. × 56.

Hololepida magna.

Fig. 24.—Head from above, showing the much folded first right elytron in place. × 6.

Fig. 25.—Outline of a cirriferous parapodium from an anterior somite without setæ and as seen from behind. × 8.
Fig. 26.—End of a middle subacicular neuropodial seta from XXV. × 56.
Fig. 27.—Tip of the same. × 250.
Fig. 28.—End of a moderately slender supraacicular neuropodial seta from XXV. × 56.
Fig. 29.—An average notopodial seta from the dorsal part of the bundle. × 56.
Fig. 30.—Mandible of *Ninoe simpla* with the stem broken and ridges shown on the left side only. × 56.
Fig. 31.—Gill (dorsal organ) from somite VII of *Aphrodita negligens*. × 24.

PLATE XXXVI. *Lepidonotus robustus*.

Fig. 32.—An elytron from the middle region. The stippling indicates the distribution of brown pigment; the white circles are the raised uncolored areas with a central yellow excretophore(?). × 5.
Fig. 33.—End of a middle neuropodial seta. × 98.
Fig. 34.—An average notopodial seta, × 98; *a*, a portion of the same, × 440.
Fig. 35.—Outline of anterior aspect of parapodium X; the notopodial setæ only are represented. × 9.

Lepidonotus cœloris.

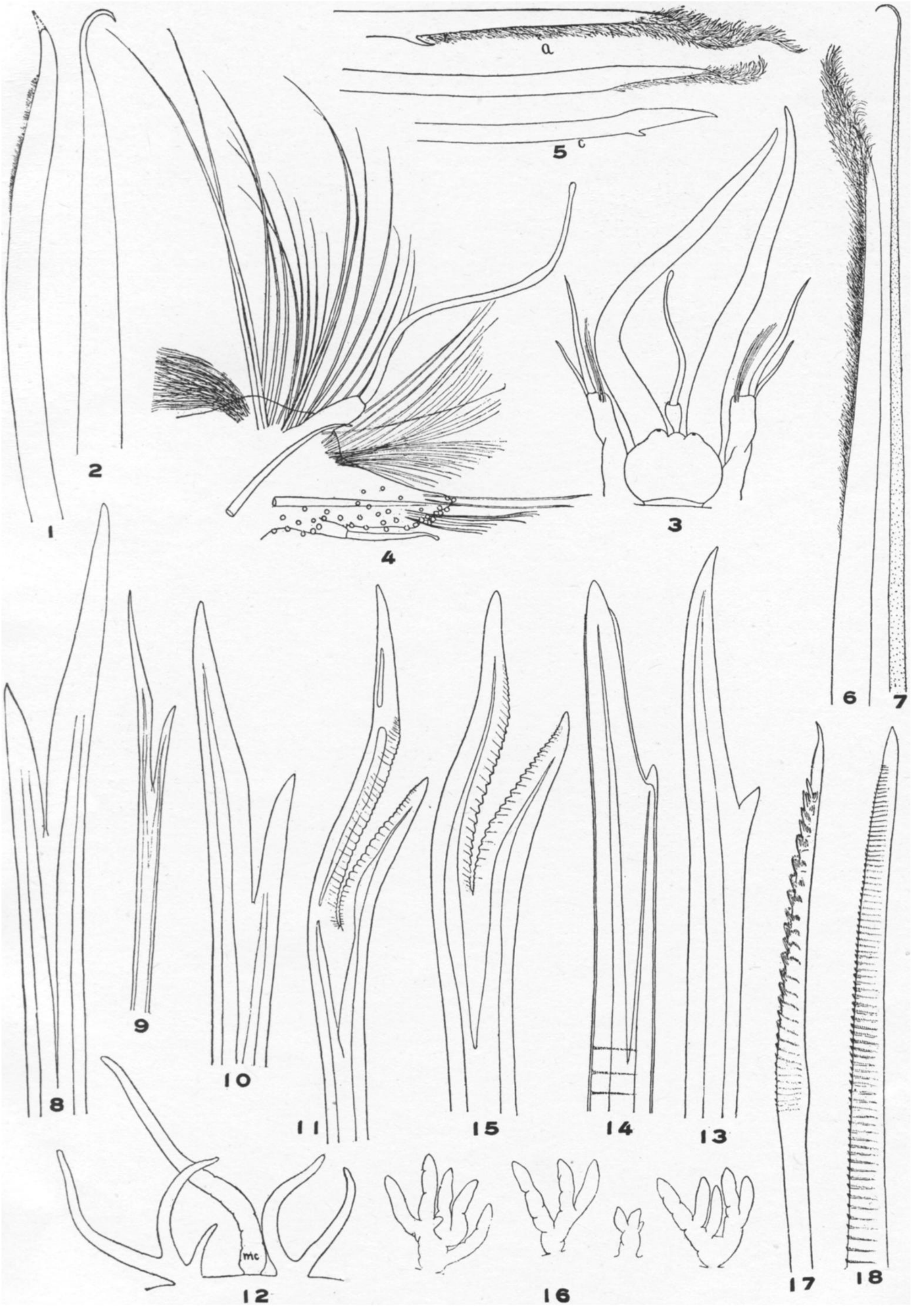
Fig. 36.—An elytron from the middle region of a medium-sized specimen. Only a portion of the sculpturing on each region is shown. × 9. *a*, one of the larger papillæ of the middle region; *b*, two of the lateral marginal papillæ; and *c*, three small rough papillæ from near the anterior end of the fringe. All × 56.
Fig. 37.—End of an average dorsal notopodial seta from XI. × 98.
Fig. 38.—A corresponding seta from somite XI of a specimen of *L. squamatus* from Wood's Hole, Mass. × 98.

Ninoe simpla.

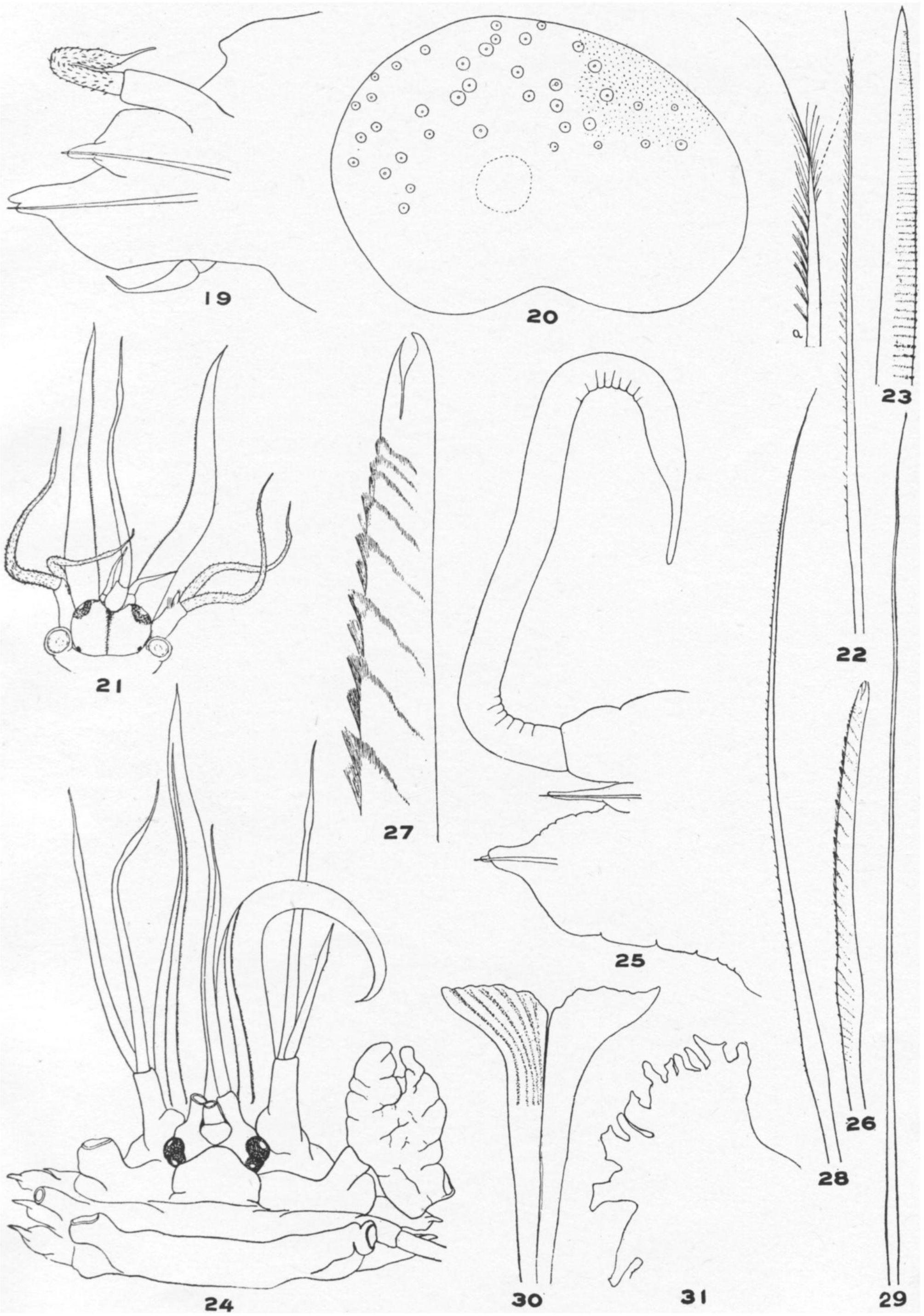
Fig. 39.—Outline of parapodium XXV, showing the acicula and the position of the dorsalmost and ventralmost neuropodial setæ. × 82.
Fig. 40.—Outline of parapodium L, showing crochets *in situ*. × 82.
Fig. 41.—An aciculum. × 250.
Fig. 42.—A margined seta. × 250.
Fig. 43.—End of a hooded crochet from a posterior parapodium. × 250.
Fig. 44.—The jaws represented in their natural relations except that the halves of the basal plate are separated. From a dissection. × 56.

Goniada annulata.

Fig. 45.—Anterior view of a parapodium (XV) of the anterior region. × 32.
Fig. 46.—Similar view of one (C) of the posterior region. × 32.
Fig. 47.—One of the large (*a*) and an accessory (*b*) jaws. × 56.
Fig. 48.—A small and a large papilla from the proboscis, and *a*, one of the latter shown in optical section. × 250.



MOORE. NORTH PACIFIC POLYCHÆTA.



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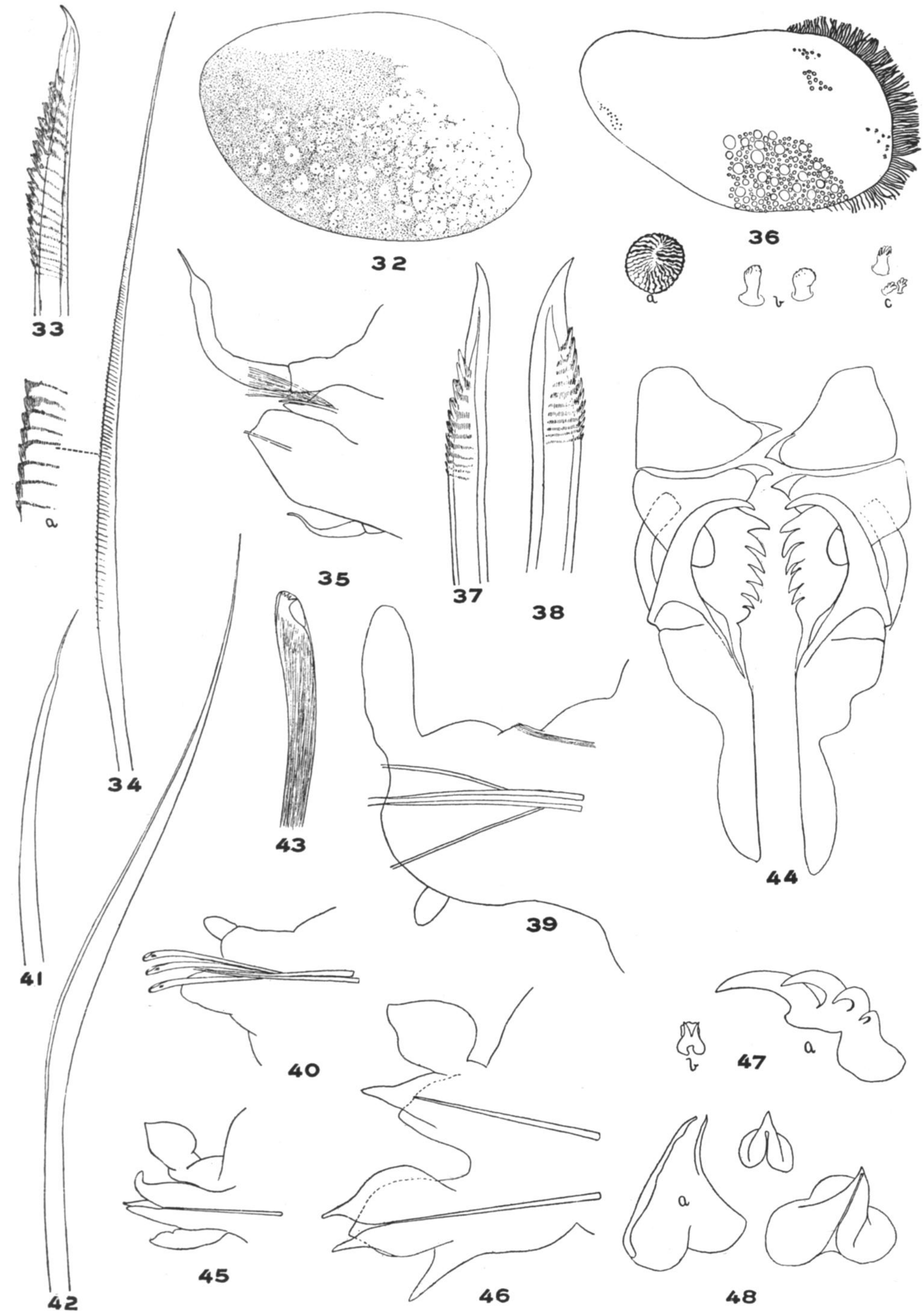

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